



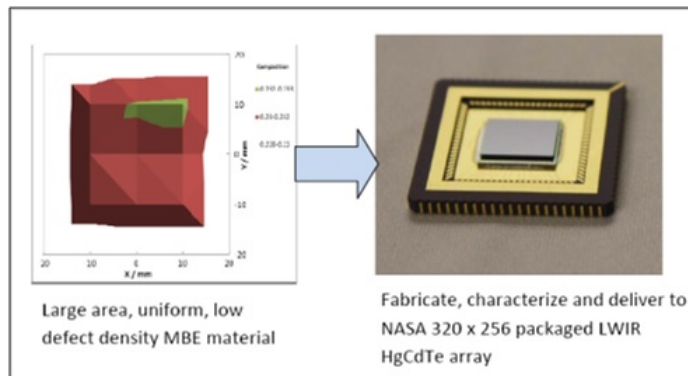
Megapixel Mercury Cadmium Telluride Focal Plane Arrays for Infrared Imaging out to 12 Microns

EPIR, Inc.

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OBJECTIVES

In this Phase I effort, mercury cadmium telluride material was grown on cadmium zinc telluride substrates, fabricated into 30 μm pitch 320 \times 256 detector arrays and hybridized to ISC9705 readout integrated circuits (ROICs) to produce focal plane arrays (FPAs) for operation in the long wavelength infrared (LWIR) spectral region with a 12 μm cutoff wavelength.



LWIR HgCdTe Material & FPA

ACCOMPLISHMENTS

NOTABLE DELIVERABLES PROVIDED

1. Multiple run LWIR MCT MBE on 3 \times 3 cm² CZT substrates. Low etch pitch, macrodefects (>2 μm), and microdefect (<2 μm) densities were measured in the grown layers. The target composition and doping densities were achieved.
2. Fabrication of 30 μm pitch 320 \times 256 detector arrays hybridized to ISC9705 ROICs. The mean dark current values obtained for our 12 μm cutoff FPAs are within the "Rule-07" expected predictions.
3. Uniformity assessment, included both material uniformity and device performance uniformity. The material characterization portion demonstrated the uniform composition and thickness of the material over the full 3 cm \times 3 cm area. The detector array shows excellent uniformity with ADC pixel counts within 0.5% of the mean ADC count.

KEY MILESTONES MET

The demonstration of low dark current, highly uniform 12 μm cut-off HgCdTe FPAs proves that the Phase I objectives have been successfully and totally met. The continuation to a Phase II project is vital to develop a producible megapixel FPA technology to be used for future NASA missions.

FUTURE PLANNED DEVELOPMENTS

PLANNED POST-PHASE II PARTNERS

Key customers for the space market will be NASA, Lockheed Martin, The Space Dynamics Laboratory and Ball Aerospace. EPIR has already identified these companies as potential customers of LWIR FPAs and has already begun dialogue with them. Within the military market the MDA and Air Force have already expressed their interest in EPIR's LWIR sensors for various war fighter applications.

PLANNED/POSSIBLE MISSION INFUSION

Large format LWIR MCT FPAs will be a valuable asset for a variety of earth science and astrophysics experiments which require IR imaging. The fabrication of large format LWIR MCT FPAs with high quantum efficiency and broad spectral response out to 12 microns will greatly increase the imaging capability of Discovery 13/14, New Frontiers 4, Europa Jupiter System and Mars 2018 systems.

PLANNED/POSSIBLE COMMERCIALIZATION

Since LWIR detection allows for unparalleled target identification, it is expected that this technology will provide a strategic advantage in missile seekers to circumvent counter-measures. LWIR cameras will be also used for civilian standoff chemical imaging. Such imagers could be used to enforce EPA standards regarding pollution monitoring, or might find applications in medical imaging.

CONTRACT (CENTER)	NNX14CG42P (GSFC)	SOLICITATION-PHASE	SBIR 2014-I
SUBTOPIC	S1.03 Sensor and Detector Technology for Visible, IR, Far IR and Submillimeter	TA	8.1.1 Detectors and Focal Planes

